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ABSTRACT

The ReTAL technique is described by using role sheets for the teacher and the student members of the research team; the "Researcher" defines the problem and searches the literature, the "Technician" plans and executes the experiment, and the "Recorder-Discussion Leader" coordinates records, interprets, evaluates, and reports the study. Each team member also helps the others. A sample lesson (the earthworm) illustrates the four phases of "Lecture," "Independent Study," "Experimental," and "Discussion" which use deductive, confrontation, inductive, and evaluation processes respectively. Instructions for writing student's reports of research are given. This open-ended method, designed to keep children and teachers involved in curriculum development, to create positive attitudes to problem solving, and to actively involve students in learning, is intended to provide a structure suitable for any program and has been used with elementary, secondary, and college students.
(AL)

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THE RESEARCH TEAM APPROACH TO LEARNING
(ReTAL): A STRUCTURE FOR OPEN-ENDEDNESS

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COLOR CODE

TEACHER'S PACKET (Director of Research)

BUFF

TITLE SHEET

ABSTRACT

SET A -- What is ReTAL?

SET B -- Purpose

SET C -- Process

SET D -- The Research Team

CANARY

ROLE SHEET 0 -- Director of Research

GOLDENROD

SAMPLE LESSON: A Study of the Earthworm
OVERVIEW

PART I

PART II

STUDENT'S PACKET

BLUE

TITLE SHEET

ROLE SHEET 1 -- The Researcher or Principal
Investigator

GREEN

ROLE SHEET 2 -- The Technician

PINK

ROLE SHEET 3 -- The Recorder-Discussion Leader

BLUE

SAMPLE LESSON: A Study of the Earthworm

PART I -- INTRODUCTION (Researcher or Principal
Investigator)

PART II -- RESEARCH PROBLEMS

GREEN

MATERIALS AND METHODS (Technician)

PINK

RESULTS AND CONCLUSIONS (Recorder-
Discussion Leader)

RESEARCH TEAM REPORT (Instruction Sheet)

RESEARCH TEAM APPROACH TO LEARNING
(ReTAL): A STRUCTURE FOR OPEN-ENDEDNESS

TEACHER'S PACKET
(Director of Research)

ABSTRACT

SET A -- What is ReTAL?

SET B -- Purpose

SET C -- Process

SET D -- The Research Team

ROLE SHEET O -- Director of Research

SAMPLE LESSON: A Study of the Earthworm

Overview

Part I

Part II

Bette J. Del Giorno, Ph.D.
Originator of ReTAL
1969

ABSTRACT

THE RESEARCH TEAM APPROACH TO LEARNING (ReTAL)

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The Research Team Approach to Learning (ReTAL) is a method of grouping individuals with specific responsibilities for the purpose of investigating a research problem by using a scientific approach. The emphasis is on team learning rather than on team teaching. The method was devised in an effort to make traditional science courses open-ended, to keep new programs open-ended, and to help students and teachers become open-minded.

ReTAL has been used successfully with elementary, secondary and college students and also, with elementary and secondary school teachers. The research team is composed of three persons usually--the Researcher, who defines the problem and makes the preliminary search into the literature; the Technician, who plans the experimental design and performs the investigations; the Recorder-Discussion Leader, who coordinates the activities, records, interprets and evaluates the findings and is responsible for the dissemination of new information.

ReTAL was developed in 1958 and was used with general science, biology and chemistry students until 1963. The author began using the method with undergraduate non-science majors at the college level and with teachers enrolled in the graduate school in 1966.

In the spring of 1967, a team of four elementary school teachers was organized to study the effectiveness of ReTAL with sixth grade students. One technician conducted ReTAL at the Annie Fisher School in Hartford and compared results of two science units with other units previously studied. Another technician ran ReTAL with one of two groups within a self-contained classroom at Sacred Heart School in Waterbury and compared results from the control and experimental groups. Evaluative techniques included taped interviews, laboratory notebook entries, oral and written tests, and observations of technical skills, scientific interest, cooperation and communication, attitude and behavioral changes.

Findings revealed that the ReTAL was successful at all levels attempted. In particular, the results of the elementary school investigations indicated that children can do research and communicate findings to others, can learn in depth by doing things for themselves, are resourceful and can learn from each other and not exclusively from the teacher. Students will begin to question and seek answers and remain highly enthusiastic if they may construct their own curriculum and direct their own activities under the guidance of the teacher.

The Research Team Approach to Learning (ReTAL)

WHAT IS ReTAL?

1. ReTAL stands for the Research Team Approach to Learning.
2. It is a method, a system, a structure for learning and solving problems.
3. It focuses on team learning and not on team teaching.
4. It is a structure that allows children and teachers to become actively engaged in research and curriculum construction.
5. It combines a research method with an organized system for investigation.
6. It is a way of grouping individuals with specific and well defined responsibilities for the purpose of investigating a research problem by using a scientific approach.
7. It is composed of a four phased process:
 - (1) Lecture Phase (deductive process)
 - (2) Independent Study Phase (confrontation process)
 - (3) Experimental Phase (inductive process)
 - (4) Discussion Phase (evaluation process)

SET B

ReTAL -- PURPOSE

WHAT IS THE PURPOSE OF ReTAL?

1. It proposes to keep children and teachers involved in ongoing research and curriculum construction.
2. It proposes to help create a positive attitude within the individual toward solving problems.
3. It proposes to involve individuals in the experimental method of problem solving.
4. It proposes to make traditional courses of study open-ended so that course content and processes may extend beyond the classroom.
5. It proposes to keep "new" programs of study open-ended.
6. It proposes to provide a structure that will fit into any existing program.

ReTAL -- PROCESS

HOW DOES ReTAL WORK?

There are four phases to the process:

1. Lecture Phase or the deductive process. This process may take place in a large room with all persons involved present. Every discipline and each topic to be studied has a certain amount of basic information that must be learned before one can work independently. During this phase then, a specialist in the field or in most cases, the teacher presents the fundamentals of the study to the group. This is the "telling" phase or the introductory part of the study.
2. Independent Study Phase or the confrontation process. This process may take place in a reading corner, library, "thinking" area, "idea" room, study carrel or on a field trip, etc. The individuals confront resource people, books, films or themselves in seeking knowledge related to the topic being investigated.
3. Experimental Phase or the inductive process. This process may take place in a laboratory, workroom, materials center, work corner, etc. Here, the individuals use their creativity to design and build models, conduct experiments, and in general, try out their own ideas.
4. Discussion Phase or the evaluation process. This process may take place in a small room with only the team members present. The purpose of this phase is to encourage the team members to discuss their work and to determine if further research and experimentation is needed to solve the problem. When the team decides the work has been completed, a research report is written. This phase can also be used for large group instruction where the teams present their findings to others.

THE PHYSICAL AREAS AND PHASES OF ReTAL

I. Lecture Phase --
The Deductive Process
in classroom, lecture
hall, large room, etc.

II. Independent Study Phase
The Confrontation Process
in resource corner, library,
"thinking" area, "idea" room,
study carrel or on a field
trip, etc.

IV. Discussion Phase --
The Evaluation Process
in seminar room, small
room, discussion corner,
etc.

III. Experimental Phase --
The Inductive Process
in the laboratory, workroom,
work corner, materials center,
etc.



ReTAL -- THE RESEARCH TEAM

I. WHAT IS A RESEARCH TEAM?

1. Usually the Research Team is composed of three persons:
 - (1) Researcher or Principal Investigator
 - (2) Technician
 - (3) Recorder--Discussion Leader
2. Each member of the team has a specific function and role.

II. HOW DOES THE TEAM FUNCTION?

1. Each team member is responsible for his own work and is responsible to his teammates and the Director of Research.
2. Each member is required to keep his team informed as to what he is doing; there must be a great deal of interaction between team members.
3. Each team member is responsible for one phase of the study and each must keep records of what he has read and of what he has done.
4. Each team member must contribute to the work of the others.
5. The team prepares a final research paper so that they can share their findings with others. (see Research Report)
6. The team disseminates its findings in writing and/or in an oral presentation (a teaching situation).

RESEARCH REPORT

RESEARCH TEAM APPROACH TO LEARNING (ReTAL)

Title Page:

TITLE: _____ DATE: _____

PRINCIPAL INVESTIGATOR: _____

TECHNICIAN(S): _____

RECORDER: _____

ABSTRACT

Page 1:

I. Introduction (Researcher or Principal Investigator)

- A. Statement of the Problem (What are you trying to find out? What information is needed to accomplish this?)
- B. Justification (Why is the study important?)
- C. Review of the Literature (What has been done on this problem already?)
- D. Discussion of the Problem

Page 2:

II. Materials and Methods (Technician(s))

- A. Hypotheses (What important question(s) do you want to answer?)
- B. Research Design (What kind of experimentation is needed to support each hypothesis? How should tests be set up and performed?)
- C. Materials Necessary (What is needed in order to experiment?)
- D. Procedures (What methods of testing will you use step by step?)

Page 3:

III. Results (Recorder--Discussion Leader)

- A. Findings (Observations and description of what was found.)
- B. Interpretation of Findings (Based on your results, what can you conclude?)
- C. Directions for Further Research (Evaluate the project and discuss areas that still need to be studied as revealed by your team's research.)

Page 4:

IV. List of References (all references used in the study)

ROLE SHEET 0

ReTAL -- Director of Research

ROLE:

You are the head of the total program and all aspects of the research problem. (The Director of Research may be the teacher, consultant, manager, etc.) You are a resource person and a guide. You are the person to whom the teams will come for guidance, information, direction, supplies and equipment. In a sense, the Director of Research is the boss or overseer for all projects in his field of competence or under his supervision. As the Director of Research, you must see to it that all the research teams are working and progressing toward predetermined goals.

DIRECTOR OF RESEARCH

(Sample Lesson)

PART I A Study of the Earthworm

OVERVIEW: (Lecture Phase: Deductive Process)

Most of us are somewhat familiar with the common earthworm. Certainly, if you have done any gardening at all, you would have met our friends of the soil. I say "friends" because these little animals are our garden helpers for they contribute to soil building, to aerating the soil and to turning the soil over and over as they migrate and eat their way from place to place.

The common earthworm belongs to the kingdom Animalia (Animals), to the Phylum Annelida (ring or segmented), to the Class Oligochaeta (Gr. "Oligo" small, "Chaeta" hair). The Genus is Lumbricus (L. worm) and the scientific name for the common earthworm is Lumbricus terrestris (L. earth) and therefore, "earthworm."

We can begin our study by asking ourselves if the earthworm is living or non-living. Once we have established our criteria for living and nonliving we can begin the process of decision making. How do we determine whether or not something is living or not?

We note that the earthworm is in the Kingdom Animalia. What criteria must we use to make this decision? Can you explain how it is that we do not call it a plant or something between a plant and animal?

What do you observe about the earthworm that would place it in the Phylum Annelida if Annelida means "ring" or "segmented"?

Can you determine the reasons for placing the organism in the class Oligochaeta if Oligochaeta comes from the Greek meaning "small hairs"?

If we question where the earthworm resides or what is its natural habitat, the name itself gives us this information whether we know the scientific name, Lumbricus terrestris or just the common name, earthworm. During the warm season we see many earthworms on and in the soil. During the cold weather they seem to disappear. Do you know where they are? Have you ever noticed too, that when it rains in the spring, it seems to "rain worms" because there are so many of them on sidewalks, on driveways, on the roads and on the grass, etc.? Have you any idea or can you guess the reason or reasons for these soil animals to come to the surface?

In our study then, we have already begun to ask basic questions about this organism. We should study the external and internal structure and function of the earthworm, study the behavior of these creatures and observe them in their natural habitat in relation to their environment and other living things.

Now, what questions would you individually and as a class like to ask about the earthworm? What would you especially like to know about these organisms? What problems do you want to study?

(Sample Lesson)

PART II A Study of the Earthworm

Student response will depend upon their experience with earthworms, their educational background in biology, their age and grade level. You should expect, however, that their questions would be similar to those listed below. Remember their level of sophistication will determine the complexity of the research they will undertake.

Some Research Problems Related to the Earthworm

1. Structure--anatomy
 - a. What is the external structure of the earthworm?
 - b. What is the internal structure of the earthworm?
2. Function--physiology
 - a. What is the purpose or function of each external part of the earthworm?
 - b. What is the purpose or function of each internal part of the earthworm?
3. Habitat
 - a. Where does the earthworm live?
 - b. What is the optimum environment for the earthworm?
 - c. What is the life range of the earthworm, that is, what are the limits of endurance, e.g., temperature, acidity and alkalinity of soil, population numbers, predator prey relationships, etc.?
4. Locomotion
 - a. Does the earthworm have special appendages for locomotion?
 - b. How does the earthworm move from place to place?
5. Behavior--sensitivity (TTSSH)
 - a. What senses does the earthworm possess?
 - (1) Taste? (3) Smell? (5) Hear?
 - (2) Touch? (4) See?
 - b. How does the earthworm behave or act?
 - (1) Response to light and darkness?
 - (2) Response to hot and cold?
 - (3) Response to wet and dry?
 - (4) Response to sea water, "salt" water, fresh water?
 - (5) Response to colors?
 - (6) Response to sound?
 - (7) Response to vibration?
 - (8) Response to pressure?
 - (9) Response to frustration?
 - (10) Response to learning maze or tasks?
 - (11) etc.
6. Life Functions
 - a. Eating--
 - (1) Ingestion
 - (a) What is the structure of the earthworm's mouth?
 - (b) How does the earthworm eat?
 - (c) What does the earthworm eat?
 - (2) Secretion
 - (a) What organs in the earthworm secrete enzymes?
 - (b) What is meant by "secretion"?
 - (c) What is an "enzyme"?
 - (d) How do enzymes aid the earthworm in the process of eating?

- (3) Digestion
 - (a) Where is food broken down in the earthworm?
 - (b) How is food digested by the earthworm?
 - (4) Absorption
 - (a) What is meant by the "absorption of food"?
 - (b) Where does absorption take place in the earthworm?
 - (5) Circulation
 - (a) Does the earthworm have a circulatory system? If so, describe.
 - (b) Does the earthworm have a heart or any other kind of pump?
 - (c) How is food circulated in the earthworm?
 - (6) Assimilation
 - (a) What does "assimilation of food" mean?
 - (b) How is food assimilated in the earthworm?
 - (7) Excretion
 - (a) Where and how are food wastes eliminated from the earthworm's body?
 - (b) What waste materials other than food does the earthworm expel from its body?
 - (c) Where and how are waste materials, other than food wastes, eliminated?
- b. Breathing--
- (1) Breathing is the mechanical process by which living things take in oxygen (O_2) and give off carbon dioxide (CO_2).
 - (a) What breathing mechanism(s) does an earthworm have?
 - (b) How does the earthworm breathe?
 - (2) Respiration is the chemical process by which living things take in oxygen to change food into water, energy and the waste product, carbon dioxide.
 - (a) How does the earthworm respire?
 - (b) What is "metabolism"?
 - (c) How is the metabolic process related to respiration?
 - (d) How does the earthworm change food into H_2O , ATP (adenosine triphosphate) and CO_2 ?
- c. Reproducing--
- (1) Reproduction refers to the process by which living things produce other living things in the likeness of the parent(s).
 - (a) What is "asexual" reproduction?
 - (b) What is "sexual" reproduction?
 - (c) Do earthworms reproduce sexually or asexually?
 - (d) What is the courtship and reproductive behavior of the earthworms?
 - (e) Are there male and female earthworms? Does each worm have both sexual parts or do they reproduce asexually?
 - (f) How is it that earthworms produce offspring earthworms that look like the parents?
 - (g) Can earthworms mate with worms of another species (terrestris), genus (Lumbricus), family (Lumbricidae) order (Macrodrili) or class (Oligochaeta)?

RESEARCH TEAM APPROACH TO LEARNING
(ReTAL): A STRUCTURE FOR OPEN-ENDEDNESS

STUDENT'S PACKET

ROLE SHEET 1 -- Director or Principal Investigator

ROLE SHEET 2 -- The Technician

ROLE SHEET 3 -- The Recorder-Discussion Leader

SAMPLE LESSON: A Study of the Earthworm

PART I -- INTRODUCTION (Researcher)

PART II -- RESEARCH PROBLEMS

MATERIALS AND METHODS (Technician)

RESULTS AND CONCLUSIONS (Recorder)

Bette J. Del Giorno, Ph.D.
Originator of ReTAL
1969

ROLE SHEET 1

ReTAL-- Director or Principal Investigator

ROLE:

This is often the person who has identified a problem and who has some idea of how it might be investigated. Regardless, this is the individual who assumes the leadership for the initial investigation. As the Researcher, you will define and clearly state the problem that you and your team will work on. You will be the one who does the preliminary search into the literature to find out what has already been done on solving the problem in question. You will become the group leader and are responsible for gathering the resource and reading materials for the project.

The Researcher or Principal Investigator must do the following:

1. Define the problem the team will work on in writing.
2. Justify why it is important to study the problem.
3. Find out as much as you can about the problem by reading, by talking to resource people, visiting resource areas, etc.
4. Discuss what you have learned with your teammates and the Director of Research.

ROLE SHEET 2

ReTAL--The Technician

ROLE:

You are a laboratory technician in that you will plan the experimental design of your project and carry out the necessary tests. You must gather experimental data in an effort to gain insight into the problem your team has defined. The Technician assumes leadership during the experimental phase or inductive process and is responsible for determining what experiments will be done and how they will be conducted.

The Technician must do the following:

1. Form hypotheses or write down some basic questions related to the problem that you think your team should try to answer.
2. Decide how you will attempt to investigate one question at a time.
3. Make a specific list of the supplies, materials and equipment you will need to conduct your experiments and give the request to the Director of Research.
4. Design the experiment(s) and run the tests, keeping accurate records of your methods and results.

ROLE SHEET 3

ReTAL--The Recorder-Discussion Leader

ROLE:

As the Recorder-Discussion Leader, you will become the "devil's advocate" in that you will prod the other team members into searching further into the literature and into doing more experiments, etc. You will coordinate their activities, record, interpret and evaluate the findings. You are also responsible for writing the final report and for disseminating the new information. The Recorder becomes the Discussion Leader when the team presents its findings to others.

The Recorder-Discussion Leader must do the following:

1. Follow the work of the Researcher and Technician very carefully and observe everything that is being done. Question what you do not understand.
2. Record the results of all the experiments.
3. Try to interpret the findings, that is, explain how it is the technician obtained the results he did.
4. Discuss the findings and your interpretations of them with your teammates and the Director of Research. Decide whether or not more work is needed on the problem.
5. Indicate directions for further research.
6. Write the final research report and be prepared to present your paper to others.

RESEARCHER OR PRINCIPAL INVESTIGATOR

(Sample Lesson)

PART I A Study of the Earthworm

INTRODUCTION (Independent Study Phase: Confrontation Process)

The Director of Research (teacher in many cases) will probably give you some background information on the earthworm. Take notes on the material presented and look up information on the earthworm to supplement what you were given. Begin to list some of the things you would like to know or study about the earthworm, for example, what does the earthworm look like externally and internally, where does it live, how does it move, how does it eat, breathe, reproduce, etc.?

Write down some of these problems and some of your reasons for wanting to work on the problems. Discuss these with your teammates and with the Director of Research.

When you have done this, go to the reading corner, library or other area and read about the earthworm and what is already known about the organism. Visit a worm farm or someone who sells "night crawlers" for bait and talk to him about the animals so that you might learn as much as you can about them and the problem you wish to investigate.

Again, discuss what you have learned with your teammates so that the technician will not begin his experiments without your advice.

Clearly define what it is you and your teammates want to study or find out. Discuss your problem with the Director of Research (teacher). This person will guide and help you in your work.

RESEARCHER OR PRINCIPAL INVESTIGATOR

(Sample Lesson)

PART II A Study of the Earthworm -- Research Problems

You may need some help in identifying and defining a problem to work on. Ask the Director of Research to help you. Some examples of wording your topic are offered below:

1. A Study of the External Parts of the Earthworm
2. A Study of the Internal Parts of the Earthworm
3. The Specific Functions of Each Organ in the Earthworm
4. A Study of the Environment in Which the Earthworm Lives
5. A Study of the Soil Around the Earthworm's Home
6. How the Earthworm Moves
7. A Day in the Life of the Earthworm
8. How the Earthworm Eats
9. A Study of Sense Perception in the Common Earthworm

If you would like more sophisticated wording, the following are offered:

1. An Examination of the External and Internal Anatomy of the Earthworm
2. An Investigation into the Functions of the Structures of the Lumbricus terrestris
3. An Ecological Study of the Earthworm's Habitat
4. The Role of the Setae in the Locomotion of Lumbricus
5. An Extensive Study of Earthworm Behavior
6. A Study of the Eating Habits of the Earthworm Gut
7. Secretory Activity in the Earthworm Gut
8. A Study of Digestive Reactions in the Common Earthworm
9. Active Transport Across the Intestinal Membranes in the Intestine of the Earthworm
10. A Comparison of the Circulatory System in the Earthworm and in the Slug.
11. The Assimilation of Food in Animal Cells
12. The Excretory Habits of the Earthworm and How They Help the Farmers
13. An Investigation into the Breathing Methods of the Earthworm
14. Oxidative Phosphorylation in the Mitochondria of the Earthworm
15. A Study of Hermaphroditism in Lumbricus
16. The Isolation of RNA and DNA from Earthworm Cells

(Sample Lesson)

PART II A Study of the Earthworm

MATERIALS AND METHODS (Experimental Phase: Inductive Process)

The Director of Research (teacher in many cases) will probably give you more background information on the earthworm. In addition, the Researcher or Principal Investigator on your team should have much more information on the subject for you. The Researcher should have explained the problem your team will be working on, that is, the basic problem should have been defined.

It is up to you now to break the problem down into subproblems. Begin to list the basic questions you need to ask in order to solve the problem defined for the team's work. For example, if your problem is stated as the following: "An Examination of the Basic Anatomy of the Earthworm," the questions you could ask related to this might be:

- (1) What are the external structures of the earthworm, and
- (2) What are the internal structures of the earthworm?

Decide how you would try to answer your questions and make a list of the materials you will need to test or find out.

Take the list to the Director of Research who will try to help you obtain what you need.

Now, do the work that will help you find out. For example, in order to answer question (1), you would have to examine the external parts of the earthworm under a magnifying lens or stereoscope. You might want to draw and label what you see or photograph it. To answer (3), you would need some dissecting tools to open the earthworm's body to observe and study the interior structures.

Be sure to record everything that you do and what you find.

RECORDER--DISCUSSION LEADER

(Sample Lesson)

PART II A Study of the Earthworm

RESULTS AND CONCLUSIONS (Discussion Phase: Evaluation Process)

The Director of Research (teacher in many cases) will probably give you some background information on the earthworm. In addition, the Researcher should have gathered much more information on the animal and have identified a problem that you and your teammates will work on. The Technician should have broken down the problem into sub-problems or simple questions related to the topic.

It is up to you, during each phase of the investigation, to know exactly what is going on and what is needed. If you think the Researcher should find more information than he has, discuss this with him. If you think the Technician should conduct more experiments or do the same ones over again, discuss this with him also. For example, if the team is studying the anatomy of the earthworm and the Researcher is not able to identify all the structures the Technician has found, he should return to the literature or seek help from the Director of Research in an effort to find out more. On the other hand, if the Technician has done an incomplete job of dissecting the worm in order to expose the internal organs, you may ask him to repeat his work until all the teammates are satisfied with one another's contributions.

Keep a daily record of what is being done and when all the experimental work has been completed, write down the findings and try to interpret the results, that is, pose alternative reasons for why the technician obtained the results he did. Discuss these with your teammates and then draw your final conclusions.

Write up the final research paper and be prepared to publish it, to teach the rest of the class or to present it at a science colloquium on the topic.

(See directions for writing the research paper.)

RESEARCH TEAM REPORT
(INSTRUCTION SHEET)

DATE: _____

GRADE: _____

TITLE OF STUDY TOPIC: _____

RESEARCHER: _____

TECHNICIAN: _____

RECORDER: _____

I. INTRODUCTION (Prepared by Researcher)

- A. Write a sentence describing your study topic or problem in your team's notebook.
- B. Explain why it is important for you to study this problem.
- C. Find out as much as you can about the topic from reading books, magazines, newspapers, talking to people, and so on.
- D. Discuss what you have learned about the topic with your teammates and your teacher (Director of Research).

II. MATERIALS AND METHODS (Prepared by Technician)

- A. Write down some important questions you want to try to answer about your topic in your team's notebook.
- B. Decide how you will try to answer one question at a time.
- C. Make a list of the supplies, equipment, and materials you will need to test or experiment.
- D. Run your tests or experiments one at a time and write down everything that you are doing. It may be important later on.

III. RESULTS AND CONCLUSIONS (Prepared by Recorder)

- A. Follow the work of the Researcher and Technician very carefully and take notes on everything that the team is doing.
- B. Write down the results of each test and experiment that the technician does in your team's notebook.
- C. Try to explain why the technician obtained the results he did from his experiments.
- D. Discuss results and reasons for obtaining the results you did with your teammates. Decide if you need to find more information, run more tests to finish your study.
- E. Be the leader of your team in teaching the class: (1) what your topic or problem is, (2) what questions you tried to answer, (3) what tests you ran, (4) what results you obtained, and (5) what you concluded.

IV. REFERENCES (used by the team throughout the study)

- A. Books, encyclopedias, etc.
- B. Magazines, newspapers, etc.
- C. Resource persons, etc.